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CLINICAL INFORMATION

Bronchial Injury and Pneumothorax after Reintubation using an Airway Exchange Catheter

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Abstract

Background and objectives: We report a case of pneumothorax caused by a bronchial perforation during a reintubation using an airway exchange catheter (AEC) in a patient with a head and neck cancer.

Case report: A 53 year old man with oropharynx carcinoma was admitted to ICU for severe pneumonia and severe acute respiratory distress syndrome (ARDS). The patient was recognized as a difficult-to-intubate patient and an endotracheal tube (ETT) was inserted through a bronchoscope. After one week of treatment, it was observed an endotracheal cuff perforation. Exchanging the endotracheal tube was necessary to achieve satisfactory pulmonary ventilation. An AEC Cook 14 was used to perform the reintubation. After reintubation, the patient presented a worsening in oxygen saturation and a chest radiography (CXR) revealed a large pneumothorax. A chest tube was inserted and we observed immediate improvement in oxygen saturation. A repeat CXR confirmed correct positioning of the chest tube and reexpansion of the right lung. A bronchoscopy performed showed a posterior laceration in the right main bronchus. The patient was extubated the following day. After four days, the chest tube was removed. A CXR performed a day after chest tube removal revealed a small right upper pneumothorax, but the patient remained asymptomatic.

Conclusions: Airway exchange catheter is a valuable tool to handle with difficult-to-intubate patients. Although the physicians generally focus their attention in avoid barotrauma - caused by oxygen supplement or jet ventilation through AEC - concern for insertion technique can minimize life threatening complications and increase the safety of AEC.

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Introduction

Exchange of endotracheal tube (ETT) in difficult-to-intubate patients is usually a challenge to physicians. A way to increase the safety of this procedure is using an airway exchange catheter (AEC). However, it is extremely important that physicians know which are the possible complications related the use of AEC.

There are many complications related to this procedure. Two categories are described: barotraumas and failure to pass the new ETT over the AEC. Pneumothorax, pneumomediastinum, pneumoperitoneum and even death have been reported¹. The aim of this case report is to alert the physicians of this life threatening complication from the use of AEC: perforation of tracheobronchial tree.

Case report

We report a case from the intensive care unit of the *Instituto do Câncer do Estado de São Paulo (ICESP)*, Brazil.

A 53 year old man with oropharynx carcinoma was admitted to ICU for severe pneumonia and respiratory failure. He developed a severe acute respiratory distress syndrome (ARDS) and needed invasive mechanical ventilation. The patient was recognized as a difficult-to-intubate patient and an endotracheal tube (ETT) was inserted through a fiberoptic bronchoscope. After one week of treatment, endotracheal cuff perforation was observed, probably due to an altered airway anatomy and technique factors. Exchange of endotracheal tube was needed to achieve satisfactory pulmonary ventilation. The patient was sedated with fentanyl, midazolam and paralyzed with cisatracurium. An AEC Cook 14 was used to perform the reintubation. There was no need to supplement oxygen through the AEC. After reintubation, the patient presented acute worsening in oxygen saturation and decreased air entry in the right hemithorax was detected on auscultation. A chest radiography (CXR) was performed and revealed a large pneumothorax (Figure 1). A chest tube was inserted and an immediate improvement in oxygen saturation was observed. A repeat CXR confirmed correct position of the chest tube and reexpansion of the right lung. A bronchoscopy was performed and showed a posterior laceration in the right main bronchus. The patient was extubated the following day. After four days, the chest tube was removed. A CXR performed one day after chest tube removal revealed a small right upper pneumothorax, but the patient remained asymptomatic.

Discussion

Reintubation is a common procedure in patients on intensive care unit (ICU). Serious complications can follow, by such as hypoxemia, airway injury, bleeding, laryngeal edema and difficulty in airway management². Patients with cancer, particularly those with head and neck cancer, represent a group with a higher incidence of difficult-to-intubate situation as compared to the general population³. The airway exchange catheter is an effective and secure way to perform reintubation of patients with difficult airway.

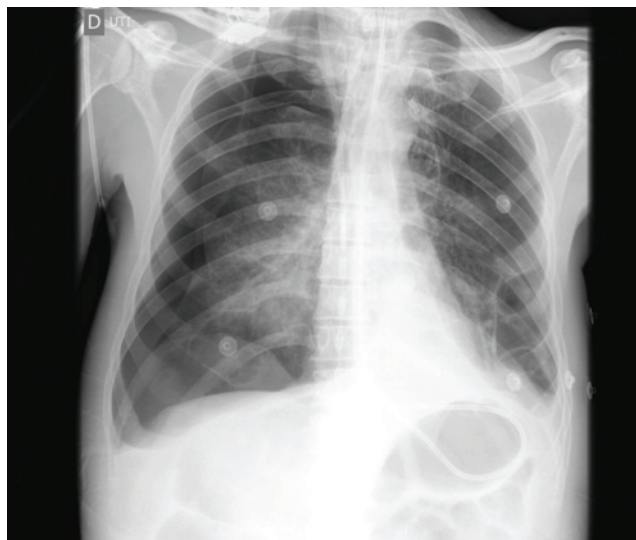


Figure 1 Antero-Posterior Chest Radiograph after Onset of Respiratory Symptoms. A large-size pneumothorax is visible in the right hemithorax.

Barotrauma and others complications derived from attempting to ventilate patients using an AEC are well-known and described extensively in literature. In fact, there are reports of up to 11% of patients developing barotrauma when the AEC is used with 50 psi jet ventilation⁴.

Our patient developed a rare and serious adverse effect related to AEC use other than barotrauma: perforation of tracheobronchial tree. To our knowledge, there are only two previous reports on this complication^{5,6}. This may be due to misdiagnosis or in other cases it can be erroneously attributed to risk factors of the patient. In the specific population of cancer patients, complications due to AEC might be more frequent than previously reported and even relate to higher morbidity and mortality.

There are some simple but effective recommendations to avoid this serious complication: First, we should watch out for the depth of insertion of the AEC. The AEC must not be introduced further than 26 cm in an adult patient and if resistance to progress the tube is encountered, we should not to force it. A laryngoscope must be used to help the new endotracheal tube pass by the supraglottic structures and cord vocals. If the resistance continues, we must rotate the endotracheal tube counterclockwise ninety degrees because the tip of the tube can be hitting in the right cord vocal or arytenoids cartilages and, with this maneuver, you can pass over it⁷.

Another way to increase the security of AEC is using a fiberoptic bronchoscope. The use of fiberoptic bronchoscope (FOB) beside the AEC may reduce the incidence of lower airway trauma. The visualization of the tip of the AEC by the FOB may avoid an overinsertion of the AEC and may increase successful tracheal intubations⁸.

In conclusion, the airway exchange catheter is a valuable tool to handle difficult-to-intubate patients. Although physicians generally focus their attention in avoiding barotrauma

caused by oxygen supplement or jet ventilation through AEC, concern for insertion technique can minimize life threatening complications - such as perforation of tracheobronchial tree - and increase the safety of AEC. The current report also illustrates an effective strategy of airway management in patients with cancer.

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